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Shocked Witness Foam-Ball Drive Diagnostic at Target Center*

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ABSTRACT

Backlighting of low density SiO_2 aerogel balls in NOVA Au (empty) hohlraums enables indirect imaging of the ablatively-driven shock trajectory versus time. The transmissivity inflection point contour is actually imaged in the experiments, which we show from analysis and simulations to correlate well with the radiation-driven shock trajectory. An advantage in using this surrogate target technique is that the drive near target center can be directly inferred in contrast to witness plates and Dante x-ray PIN diode arrays which are tailored to measure drive near the hohlraum wall. Such a distinction is critical for Nova hohlraums fitted with axial Au discs or P_2-shields which can give rise to a significant local enhancement in drive temperature near target center. We provide experimental corroboration for a predicted 20 eV (40%) increase in peak drive temperature (x-ray flux) using a flattop 1 ns pulse. Lower order flux asymmetry is negligibly small implying nearly uniform enhancement of drive around the surrogate target. Simple analytic estimates of the peak radiation temperature with and without P_2-shields show excellent agreement with radiation-hydrodynamic simulations.

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